

## Dividing Polynomials - NOTES

Use long division to divide the integers.

1)  $5758 \div 3$

$$\begin{array}{r}
 1919 \\
 3 \overline{) 5758} \\
 \underline{3} \phantom{0} \phantom{0} \phantom{0} \\
 27 \phantom{0} \phantom{0} \phantom{0} \\
 \underline{27} \phantom{0} \phantom{0} \phantom{0} \\
 05 \phantom{0} \phantom{0} \phantom{0} \\
 \underline{3} \phantom{0} \phantom{0} \phantom{0} \\
 28 \phantom{0} \phantom{0} \phantom{0} \\
 \underline{27} \phantom{0} \phantom{0} \phantom{0} \\
 1
 \end{array}$$

$$1919 \frac{1}{3}$$

Divide.

2)  $(x^3 + 12x^2 + 27x - 49) \div (x + 6)$

$$\begin{array}{r}
 x^2 + 6x - 9 \\
 x+6 \overline{) x^3 + 12x^2 + 27x - 49} \\
 \underline{-(x^3 + 6x^2)} \phantom{-49} \\
 6x^2 + 27x \phantom{-49} \\
 \underline{-(6x^2 + 36x)} \phantom{-49} \\
 -9x - 49 \\
 \underline{-(-9x - 54)} \\
 5 \text{ REMAINDER}
 \end{array}$$

$$x^2 + 6x - 9 + \frac{5}{x+6}$$

3)  $(8x^3 - 62x^2 - 82x - 64) \div (x - 9)$

$$\begin{array}{r}
 8x^2 + 10x + 8 \\
 x-9 \overline{) 8x^3 - 62x^2 - 82x - 64} \\
 \underline{-(8x^3 - 72x^2)} \phantom{-82x - 64} \\
 10x^2 - 82x \phantom{-64} \\
 \underline{-(10x^2 - 90x)} \phantom{-64} \\
 8x - 64 \\
 \underline{-(8x - 72)} \\
 8 \text{ REM.}
 \end{array}$$

$$8x^2 + 10x + 8 + \frac{8}{x-9}$$

$$4) (4r^3 - 14r^2 - 59r - 8) \div (r - 6)$$

$$\begin{array}{r}
 4r^2 + 10r + 1 \\
 r-6 \overline{) 4r^3 - 14r^2 - 59r - 8} \\
 \underline{\ominus 4r^3 - 24r^2} \phantom{- 8} \\
 10r^2 - 59r \phantom{- 8} \\
 \underline{\ominus 10r^2 - 60r} \phantom{- 8} \\
 1r - 8 \\
 \underline{\ominus 1r - 6} \\
 -2 \text{ REM.}
 \end{array}$$

$$4r^2 + 10r + 1 - \frac{2}{r-6}$$

$$5) (3r^3 + 6r^2 + 3r) \div (r + 2)$$

$$\begin{array}{r}
 3r^2 + 3 \\
 r+2 \overline{) 3r^3 + 6r^2 + 3r + 0} \\
 \underline{\ominus 3r^3 + 6r^2} \phantom{+ 0} \\
 0r^2 + 3r + 0 \\
 \underline{\ominus 3r + 6} \\
 -6 \text{ REM.}
 \end{array}$$

$$3r^2 + 3 - \frac{6}{r+2}$$

$$6) (v^3 + 3v^2 - 4) \div (v + 3)$$

$$\begin{array}{r}
 v^2 \\
 v+3 \overline{) v^3 + 3v^2 - 4} \\
 \underline{\ominus v^3 + 3v^2} \\
 0 - 4 \text{ REMAINDER}
 \end{array}$$

$$v^2 - \frac{4}{v+3}$$

$$7) \frac{19p^3 + 18p^2 + 4}{p+2}$$

$$\begin{array}{r}
 19p^2 - 20p + 40 \\
 p+2 \overline{) 19p^3 + 18p^2 + 4} \\
 \underline{\ominus 19p^3 + 38p^2} \phantom{+ 4} \\
 -20p^2 + 4p \phantom{+ 4} \\
 \underline{\ominus -20p^2 - 40p} \phantom{+ 4} \\
 40p + 4 \\
 \underline{\ominus 40p + 80} \\
 -76 \text{ REM.}
 \end{array}$$

$$19p^2 - 20p + 40 - \frac{76}{p+2}$$

$$8) (x^4 + 2x^3 - 22x^2 - 39) \div (x-4)$$

$$\begin{array}{r}
 x^3 + 6x^2 + 2x + 8 \\
 x-4 \overline{) x^4 + 2x^3 - 22x^2 - 39} \\
 \underline{\ominus x^4 - 4x^3} \phantom{- 22x^2 - 39} \\
 6x^3 - 22x^2 \phantom{- 39} \\
 \underline{\ominus 6x^3 - 24x^2} \phantom{- 39} \\
 2x^2 + 0x \phantom{- 39} \\
 \underline{\ominus 2x^2 - 8x} \phantom{- 39} \\
 8x - 39 \\
 \underline{\ominus 8x - 32} \\
 -7 \text{ REM.}
 \end{array}$$

$$x^3 + 6x^2 + 2x + 8 - \frac{7}{x-4}$$